

Continuity of Care and Clinical Effectiveness: Treatment of Posttraumatic Stress Disorder in the Department of Veterans Affairs

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Abstract

Evaluation of the quality of outpatient treatment for patients with severe psychiatric or addictive disorders has often focused on the assessment of continuity of care (COC) as measured with administrative data. However, there has been little empirical evaluation of the relationship of measures of COC and treatment outcomes. This study used hierarchical linear modeling to examine the relationship between 6 indicators of COC and 6 outcome measures in a multisite monitoring effort for veterans with war-related posttraumatic stress disorder. There were few consistently significant associations between COC and outcome measures. Although measures of COC at the level of individual patients were associated with reductions in substance abuse symptoms, when COC measures were averaged to the site level and examined with hierarchical linear modeling models, thereby reducing the impact of intrasite selection bias, they were not associated with any desired outcomes. COC measures, at least in the sample used for this study, are not consistently associated with desirable client outcomes and may therefore be less than ideal performance measures in outcome evaluations following inpatient treatment, except to the extent that COC is considered to be an intrinsic indicator of higher quality regardless of its relationship to outcomes.

A number of important changes in the mental health field and in the larger health care environment have contributed to an increasing emphasis on monitoring the quality of outpatient mental health care.¹ The ideal method for assessing the quality of outpatient mental health care would be a comprehensive and detailed examination of both client outcomes and the process of care that produced those outcomes. However, both contacting patients to administer standardized surveys and interviewing program staff are often costly endeavors and entail numerous practical difficulties.^{2,3} Analysis of administrative data to systematically examine the process of care is thus widely favored as an alternative approach to assessing program quality.^{4,5}

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Information from administrative data sets is most commonly used to assess continuity of care. Early versions of the principal instrument for evaluating managed care organizations (the Health Plan Employer Data and Information Set) had only 1 measure of the quality of mental health care: the percentage of inpatients hospitalized for a major affective disorder who received an outpatient visit within 30 days of discharge.⁶ The selection of this measure, even without research demonstrating its value as an indicator of client outcomes, demonstrates the high face validity accorded to continuity of care measures. Continuity of care is viewed by many as a primary indicator of the quality of outpatient mental health care⁷⁻¹¹ even though few empirical studies have shown it to have a relationship with clinical outcomes.^{5,12}

Continuity of care is difficult to operationalize because it has been used to refer to almost all aspects of service delivery, including the degree to which services are individualized, culturally sensitive, and comprehensive.⁷ Continuity of care was conceptualized in a narrower sense as *sustained contact* represented by 3 related concepts: (1) *regularity of care* as indicated by an evenness in the use of the services over time and the absence of a hiatus in care^{12,13-15}; (2) *continuity of treatment across organizational boundaries*, eg, through the transition from inpatient to outpatient services or between different types of outpatient services^{6,16-19}; and (3) *provider consistency*, ie, involvement with a limited number of consistently available providers.²⁰⁻²² In this study 6 measures of continuity of care are developed that address these 3 concepts. Administrative data and an outcomes monitoring data set concerning veterans discharged from programs that provide specialized treatment for military-related posttraumatic stress disorder (PTSD) are used in this study to examine the association of these 6 continuity of care measures: (1) with each other, (2) with patient characteristics, and (3) with outcome measures 4 months after discharge.

Methods

In 1993, a national VA initiative was implemented to monitor clinical outcomes from programs that provide specialized inpatient treatment for veterans with military-related PTSD.²² These programs offer a combination of medication, psychotherapy, and psychosocial rehabilitation services. By the end of January 2000, 62 of these programs had participated in this evaluation effort. The current study focuses on a subset of 35 of these programs that were of a clearly defined program type, allowing us to control for program type in the analysis. Some of the 27 excluded programs were closed, while others converted to day hospitals or underwent multiple changes at various points in time.

Sources of data

Patients admitted to the 35 programs were assessed with a brief, standardized self-report questionnaire both at the time of admission and 4 months after discharge. These questionnaires were completed either directly by the veterans or, when necessary, by a VA staff member who conducted a telephonic interview. In addition, each veteran's primary clinician completed a structured discharge summary describing well-defined parameters of their participation during inpatient treatment. Outcomes monitoring data were merged with national outpatient treatment files in which the delivery of all VA outpatient services is documented. The merged data were then used to create continuity of care measures that are described below.

Sample

Admission data were successfully merged with administrative data for 7770 veterans. Of these 7770 veterans, 5462 (70.3%) were successfully contacted after discharge and completed the follow-up interview. However, only 2357 veterans (31.5%) were followed-up between 3½ to 4½ after discharge. The analytic sample for this study was restricted to those interviewed during this period

of time so that outcome data would correspond to administrative measures that uniformly accessed continuity of care during the first 4 months after discharge.

Measures

Sociodemographic characteristics

Sociodemographic data obtained at baseline included measures of age, gender, race, whether Hispanic, marital status, education, and the travel distance from the veteran's residence to the facility in which the program was located. Data were also collected on whether the veteran received fire in a combat zone, participated in atrocities, or received VA compensation for PTSD.

Treatment process measures

Treatment process measures documented length of stay; days on the waiting list prior to admission; the discharging clinician's assessment of the veteran's commitment to treatment (5-point Likert-type scale); whether medications were prescribed at discharge; whether the veteran planned to participate in patient reunions; and veterans' satisfaction with the program (based on veterans' reports at the time of follow-up). Two variables also were constructed to specify whether the program was a specialized inpatient PTSD unit (long-term inpatient program), or an evaluation and brief treatment PTSD unit (short-term inpatient program), as contrasted with a PTSD residential rehabilitation program (nonhospital residential program).

Clinical measures

Five clinical domains were assessed both at baseline and 4 months after discharge: (i) PTSD symptoms, (ii) substance abuse, (iii) general psychiatric/physical health, (iv) violent behavior, and (v) employment. These domains and the associated measures relate to outcomes of primary interest in the treatment of PTSD.

Because of their importance for specialized PTSD programs, PTSD symptoms were measured in 2 ways, using (i) the Short Form of the Mississippi Scale for Combat-Related PTSD (range = 11–55), an instrument that has been validated in a large sample of outpatients,²³ and (ii) a 4-item PTSD Scale (range 4–20) developed at the Northeast Program Evaluation Center (the NEPEC PTSD Scale)(Cronbach coefficient $\alpha = .67$).

Alcohol and drug abuse were measured by using composite indices from the Addiction Severity Index (range 0–1),²⁴ a widely used and well-validated measure of substance abuse outcome as well as whether the veteran had a diagnosis of drug or alcohol dependence. Several additional measures were used to evaluate the general psychiatric and physical health of each veteran. These measures addressed whether the veteran had made a suicide attempt, whether the veteran had been hospitalized for psychiatric problems at the time of admission, the total number of psychiatric diagnoses at admission, and whether the veteran had any medical problems.

Violent behavior was measured by the following items that were adapted from the National Vietnam Veterans Readjustment Study (range 0–4)²⁵: (i) destruction of property, (ii) threatening someone with physical violence without a weapon, (iii) threatening someone with a weapon, and (iv) physically fighting with someone (Cronbach coefficient $\alpha = .71$). Employment was measured using reported earned income (range \$0–\$9850).

Continuity of care measures

The 6 continuity of care measures were selected from the literature so as to represent 3 major aspects/facets of continuity of care: (1) regularity of care, (2) continuity across organizational boundaries, and (3) provider consistency. Regularity of care was measured by the number of months in

which the veteran had at least 1 visit (range 0–4) and by the number of 2 month periods in which the veteran had 2 or more visits (range 0–2).

Continuity across organizational boundaries was measured by whether the veteran received any outpatient treatment during the first 30 days or the first 4 months after discharge.

Provider consistency, the third aspect of sustained contact, was measured with 2 composite indices, the Continuity of Care (COC) Index and the Modified Continuity Index (MCI). Both measures are based on the number of visits and the number of providers. The COC Index is based on the following formula developed by Bice and Boxerman²⁰:

$$COC = \frac{\sum_{j=1}^s n_j^2 - n}{n(n-1)}$$

where n equals the total number of visits and n_j is the total visits to the j th provider. This measure generates a continuity of care score from 0 to 1, with 1 representing more visits with fewer providers and 0 representing fewer visits with each of several providers. The second index, the MCI as developed by Magill and Senf, is calculated as follows²⁶:

$$MCI = \frac{1 - [n \text{ of providers} / (n \text{ of visits} + 0.1)]}{1 - [1 / (n \text{ of visits} + 0.1)]}$$

This index takes a different approach to calculating a measure based on a 0 to 1 scale in which 1 represents more visits with fewer providers and 0 represents fewer visits with numerous providers.

Data for continuity of care measures were derived from the VA's outpatient care file, which contains a record of the date, clinic type, and unique provider code for all outpatient services provided by VA clinics to non-inpatients.

Analysis

There were 4 steps to the analysis. First, a series of analyses of variance (ANOVAs) and chi-square tests were conducted to identify measures of baseline characteristics and service usage that were significantly different between veterans interviewed in the follow-up window and others participating in the outcomes monitoring protocol.

Next, the degree to which continuity of care measures were correlated with one another was examined.

Third, hierarchical linear modeling (HLM) and generalized estimating equation (GEE) modeling were used to examine the strength of the association between baseline client characteristics, treatment process measures (including measures of program participation), and the 6 continuity of care measures.²⁷ GEE was used for those continuity of care measures that had a binomial or poisson distribution while HLM was used for measures with a normal distribution. The strength of each association was used as an indicator of the importance of each relationship and is discussed as such.

In a standard regression equation the assumption is made that the observations are independent. However, data from individuals discharged from the same program may be correlated, thus violating this assumption. Allowing the intercept in the regression equations to differ across sites using HLM adjusts the standard errors for the correlated nature of the data and addresses this particular problem.^{28,29} As described by Liang and Zeger,³⁰ GEE extends the generalized linear model to allow for correlated observations. The PROC MIXED and GENMOD procedure of the SAS ® software system (SAS Institute, Cary, NC) were respectively used for the HLM and GEE analyses.

Lastly, 2 sets of outcomes analysis were conducted that also used HLM. In the first set, a set of models with 6 dependent measures of change in client clinical outcomes was examined. These measures were created by subtracting measures at program entry from measures obtained 4 months after discharge for each client. Thus, with the exception of employment, a negative value for these measures indicates improvement in a client's health status. Individual measures of 6 continuity of

care measures were the principal independent measures. These models contained covariates that controlled for possibly confounding sociodemographic, baseline health, social adjustment, and treatment process measures, including the baseline value of the change score.

In the second set of analyses, individual measures of continuity of care were averaged across individuals at the site level (ie, across geographically disparate programs providing specialized inpatient treatment for military-related PTSD). This approach reduces the influence of selection biases that may have operated within particular sites at the individual level.

Because there were 6 continuity of care measures and 6 outcome measures for a total of 36 analyses, both an alpha of $P < .05$ and a Bonferroni corrected alpha of $P < .0014$ ($.05/36$) were used.

Results

Sample characteristics

Significant differences were found on several baseline sociodemographic characteristics between veterans interviewed within the follow-up window and other veterans (ie, who either did not have a follow-up survey completed or who were surveyed outside of the follow-up window) (Table 1). Those interviewed in the follow-up window were better off on health status indicators and several characteristics in the social adjustment and program participation domains. Although the magnitude of these differences was small, the sample was not perfectly representative of patients treated in this program.

Continuity of care

The within-group correlations of some of these measures are at a high enough level to indicate that they are measuring the same underlying concept (eg, regularity of care), but several correlations are much lower indicating that they are not duplicative (Table 2).

Client characteristics and continuity of care

Significant associations were observed between several patient characteristics and continuity of care (see Table 3 showing results for only those baseline patient characteristics that had a statistically significant association with a continuity of care measure). However, only 2 client characteristics were consistently associated with multiple continuity of care measures. Greater distance between the veteran's residence and the program in which they were treated was associated with less continuity of care on all but one measure (presumably because of greater difficulty getting to a VA facility for outpatient care). Prescription of medications at discharge, in contrast, was associated with greater continuity of care on all the measures except the 2 indicators of provider consistency (most likely because these veterans returned to the VA to refill their prescriptions). The absolute value of the coefficients involving distance are small because they are unstandardized regression coefficients, ie, they indicate the amount of change in this dependent variable associated with a 1 unit change in the independent variable (eg, only 1 mile in the distance measure).

Continuity of care and outcomes

Continuity of care measures at the level of individual patients were found to be significantly associated with 3 clinical outcomes. The most robust finding was that all 6 continuity of care measures showed a significant association with reduced alcohol problems (ASI) (Table 4). In addition, one measure, months of contact, was found to be associated with greater declines in drug abuse problems (ASI). Furthermore, the COC Index was associated with declines in PTSD symptoms on both measures of PTSD. Finally, contrary to expectations, greater regularity of care was positively

Table 1
Veteran characteristics for those with and without a follow-up interview*

	Follow-up interview 3.5–4.5 months (<i>n</i> = 2357) [†]	Follow-up interview does not exist or out of range (<i>n</i> = 5319) [†]	<i>F</i> / χ	<i>P</i>
Client sociodemographic characteristics				
Age	50.4 \pm 5.62	49.6 \pm 5.61	29.1	.001
Education	12.8 \pm 2.07	12.8 \pm 1.99	0.034	.854
Female	28 (1.18%)	59 (1.16%)	0.010	.893
African American	499 (21.3%)	1356 (26.8%)	25.9	.001
Hispanic	172 (7.34%)	265 (5.24%)	12.7	.001
Married	1037 (44.3%)	2008 (39.7%)	13.8	.001
Received VA compensation for PTSD	1176 (50.3%)	2602 (51.1%)	1.01	.314
Participated in atrocities	581 (24.8%)	1300 (25.7%)	0.667	.414
Received fire in combat zone	2219 (94.8%)	4780 (94.5%)	0.186	.666
Miles from program	99.0 \pm 55.71	97.1 \pm 56.4	1.88	.170
Treatment process measures (including program participation measures)				
Length of stay in days	47.4 \pm 33.7	43.5 \pm 31.5	23.2	.001
Days on waiting list	49.2 \pm 62.6	39.6 \pm 60.9	37.0	.001
Personal commitment to therapy	2.61 \pm 0.866	2.53 \pm 0.897	13.5	.001
Medications prescribed at discharge	1967 (84%)	4251 (84.1%)	0.018	.893
Satisfaction with program	15.7 \pm 2.69	15.5 \pm 2.87	3.68	.055
Plan to participate in reunions	1615 (68.5%)	3000 (59.1%)	61.5	.001
Evaluation and brief treatment PTSD unit	589 (24.9%)	1352 (30.2%)	21.1	.001
PTSD residential rehabilitation program	922 (39.1%)	1815 (35.7%)	7.99	.005
Clinical measures				
# of psychiatric diagnosis	2.4 \pm 1.25	2.5 \pm 1.29	11.25	.001
PTSD (short Mississippi)	40.7 \pm 5.84	41.1 \pm 5.62	6.88	.009
PTSD (4-item scale)	17.1 \pm 2.47	17.2 \pm 2.43	0.650	.420
Alcohol problem (ASI)	0.139 \pm 0.205	0.163 \pm 0.228	19.5	.001
Drug problems (ASI)	0.0553 \pm 0.092	0.067 \pm 0.105	20.8	.001
Diagnosis of alcohol abuse dependence	1223 (52.2%)	2713 (53.7%)	1.35	.245
Diagnosis of drug abuse dependence	729 (31.1%)	1768 (35%)	10.7	.001
Suicide attempt	1143 (48.5%)	2588 (51.1%)	4.12	.042
Hospitalized at admission	547 (23.3%)	1274 (25.2%)	3.13	.077
Medical problems	2342 (63.3%)	4251 (63.3%)	0.000	.998
Violence index	1.67 \pm 1.35	1.83 \pm 1.38	19.5	.001
Employment earnings (monthly)	181 \pm 523	178 \pm 570	0.028	.866
Continuity of care measures				
Continuity of Care Index	0.243 \pm 0.197	0.249 \pm 0.212	1.65	.200
Modified Continuity Index	0.632 \pm 0.239	0.624 \pm 0.251	1.62	.203
Number of stops	26.5 \pm 36.1	24.3 \pm 33.6	6.24	.013
# of months with at least 1 outpatient visit	3.24 \pm 1.02	3.15 \pm 1.05	12.7	.001
Bi-months with at least 2 stops	1.84 \pm 0.38	1.82 \pm 0.40	4.97	.026
Any outpatient visit within 30 days of discharge	1742 (73.9%)	3543 (69.7%)	13.7	.001
Readmission within 14 days	32 (1.36%)	94 (1.91%)	2.87	.053
Inpatient readmission within 4 months	234 (9.93%)	574 (11.3%)	3.12	.042

**N* = 7391–7439 with the exception of satisfaction with program for which *n* = 5112.

[†]Values are either mean \pm SD or *N* and percentages (values in parentheses indicate percentage).

Table 2
Interrelationship of continuity of care measures*

	Continuity of Care Index	Modified Continuity Index	Months with at least 1 outpatient visit	Bi-months with at least 2 stops	Outpatient visit within 30 days of discharge	Outpatient visit within 4 months of discharge
Continuity of Care Index	1.000	.700 (.001)	.036 (.086)	.027 (.197)	.063 (.003)	.015 (.464)
Modified Continuity Index	...	1.000	.209 (.001)	.054 (.009)	.195 (.000)	.023 (.274)
Months with at least 1 outpatient visit		...	1.000	.802 (.001)	.403 (.000)	.333 (.001)
Bi-months with at least 2 stops			...	1.000	.294 (.001)	.313 (.001)
Outpatient visit within 30 days of discharge				...	1.000	.428 (.000)
Outpatient visit within 4 months of discharge					...	1.000
						...

*N = 2357.

associated with the NEPEC PTSD Scale, indicating more symptomatic clinical outcomes in association with more regular clinic attendance. With a Bonferonni corrected alpha of $P < .0014$, only 3 of the continuity of care measures remained significantly associated with outcomes—all involving greater reductions in alcohol problems.

With the replacement of measures that assess individual continuity of care with measures of the average level of continuity of care across individuals at each site (see Table 5), there were 7 significant relationships at $P < .05$, all suggesting that clients who received treatment at sites with higher average continuity of care had *poorer* outcomes. Similar to the findings with individual level continuity of care measures, the regularity of care measures was associated with the worsening of PTSD symptoms on both measures of PTSD. In addition, contrary to findings that used individual level continuity of care measures, the COC Index averaged to site level was associated with greater alcohol abuse problems as well as greater drug use. The one other significant relationship observed with the use of site averages as independent variables was between bi-months with at least 2 stops and greater violent behavior. However, none of these relationships were significant at the Bonferonni corrected alpha of $P < .0014$.

Discussion

In this study, a large outcomes monitoring data set was used to determine whether administrative measures of continuity of care were associated with greater improvements in client health status.

Continuity of care measured at the individual level was consistently associated with greater reductions in alcohol abuse but was not significantly related to any other outcomes after correcting for multiple comparisons. In contrast, when site averages of continuity of care measures were used, there was no evidence of any relationship between continuity of care and better alcohol outcomes. In addition, prior to correcting for multiple comparisons, several continuity of care measures were associated with worse outcomes in PTSD symptoms, alcohol and drug use, and violent behavior. While these findings are somewhat ambiguous, we believe analyses with site averages are less vulnerable to selection bias because lower levels of outpatient service use by the small number of individual patients who abuse substances at each site will not substantially affect overall continuity

Table 3

Relationship of continuity of care indicators and client characteristics*

	Number of months with at least 1 outpatient visit		Bi-months with at least 2 stops		COC		MCI		Outpatient visit within 30 days of discharge		Outpatient visit within 4 months of discharge	
	B	P	B	P	B	P	B	P	B	P	B	P
Married†	.0184	.0977	.0046	.54	-.00673	.29	-.0195	.059	.0749	.51	2.82	.0047
African American	.0474	.0016	.0135	.11	-.0174	.034	.0066	.62	.1489	.088	-.1613	.53
Gender	-.0042	.92	.0422	.0003	-.0185	.51	-.01979	.67	-.2766	.44	.5895	.61
Received fire in combat zone	-.0662	.0093	-.0124	.40	.024	.092	.044	.059	-.0635	.0669	-.1974	.67
Miles from program	-.0007	.0001	-.0003	.0001	-.00002	.75	-.00021	.024	-.0053	.0001	-.0095	.0001
Number of psychiatric diagnosis	-.0097	.75	-.0007	.97	.000751	.58	.00082	.70	.4594	.0441	.1386	.72
Drug abuse dependence	-.0247	.12	-.0257	.022	-.0077	.40	.00391	.79	-.4515	.0001	.0898	.74
Hospitalized at admission	-.063	.0006	-.0448	.0118	.00387	.63	.0188	.15	.2085	.034	-.2554	.16
Any medical problems	.0217	.17	-.004	.69	-.0195	.0028	-.00673	.52	.0811	.41	.0947	.60
Length of stay	.031	.056	.0126	.20	.000402	.96	.0144	.27	.4355	.0064	.2351	.22
Medications prescribed at discharge	.0567	.0022	.0347	.0027	.00397	.64	.0253	.064	.3618	.0073	.8523	.0003
Satisfaction with program	-.0551	.0561	-.0029	.0485	.000178	.89	-.00015	.94	-.0155	.43	-.042	.11
Personally committed to therapy	.0088	.22	-.0031	.54	.00667	.12	.0095	.16	.0572	.39	.4144	.0003

* N = 2264.

† Only independent variables that were significant are presented here. The following variables were not significant: age, education, Hispanic, service connected PTSD, participated in atrocities, alcohol problem (ASI), alcohol abuse dependence, PTSD (Short Mississippi), PTSD1 (4-item scale), drug problem (ASD), evaluation and brief treatment PTSD unit, suicide attempt, violence index PTSD, employment earnings (monthly), residential rehabilitation program, will veteran participate in reunions, days on wait list.

Table 4
Relationship of continuity of care indicators with changes in client health status at the patient level*

	Dependent variables											
	PTSD (Scale: Mississippi)		PTSD (4-item scale)		Alcohol abuse		Drug abuse		Violence		Employment	
	B	P	B	P	B	P	B	P	B	P	B	P
Number of months with at least 1 outpatient visit	0.233	.075	0.176	.0022	-0.0157	.0001	-0.00327	.018	-0.0359	.12	-15.8	.11
Bi-months with at least 2 stops	0.644	.065	0.42	.0063	-0.0261	.0031	-0.00514	.16	-0.0498	.42	-24.9	.35
COC	-2.33	.011	-0.895	.026	-0.0665	.0029	-0.00784	.42	-0.165	.31	-48.3	.47
MCI	-0.870	.110	-0.23	.34	-0.0404	.0031	-0.00632	.27	-0.0735	.45	-14.6	.72
Outpatient visit within 30 days of discharge	-0.313	.28	-0.039	.76	-0.0264	.0003	-0.00482	.12	-0.0611	.24	-5.30	.81
Outpatient visit within 4 months of discharge	0.579	.28	0.265	.26	-0.0504	.0002	-0.00919	.10	-0.0989	.29	-5.07	.90

*N is between 2155 and 2264.

Table 5
Relationship of site level continuity of care indicators and changes in client health status*

	Dependent variables											
	PTSD (Scale: Mississippi)		PTSD (4-item scale)		Alcohol abuse		Drug abuse		Violence		Employment	
	B	P	B	P	B	P	B	P	B	P	B	P
Number of months with at least 1 outpatient visit	4.55	.0291	1.85	.0276	0.0304	.19	0.00372	.77	0.449	.11	-8.45	.90
Bi-months with at least 2 stops	16.2	.0056	6.41	.0069	0.0922	.17	-0.00371	.92	1.84	.0215	47.8	.81
COC	-6.80	.46	-0.351	.93	0.235	.0245	0.108	.0451	-0.00794	.99	278	.38
MCI	0.137	.98	2.01	.43	1.25	.072	0.0565	.127	0.119	.89	-70.8	.72
Outpatient visit within 30 days of discharge	7.07	.067	3.02	.053	0.062	.17	0.0434	.066	0.649	.223	9.16	.95
Outpatient visit within 4 months of discharge	13.9	.18	5.29	.21	0.0684	.56	0.0182	.77	0.925	.51	-105	.76

* N is between 2247 and 2264.

of care at a particular site. These analyses thus tend to undercut the analyses conducted with individual level continuity of care measures and suggest that continuity of care measures, at least in the sample used for this study, are not consistently associated with desirable client outcomes.

In interpreting these apparently paradoxical results, the potential biases that are inherent in observational studies that relate individual service utilization data to outcomes must be carefully considered. Especially in the case of substance abuse disorders, patients who are doing poorly are less likely to attend treatment and may even be asked, as a matter of clinical policy, not to attend treatment when they are intoxicated from alcohol or high on drugs. Thus, the greater improvements in client health status observed in association with higher levels of continuity of care when measured at the individual level may reflect withdrawal from treatment or policy-related exclusion from treatment of patients who are using alcohol or drugs, rather than the beneficial effects of continuity of care. In this view the most plausible interpretation of the findings is not that continuity of care results in better outcomes, but rather that increased substance use results in poorer continuity of care.

When site averages are used, however, selection bias is likely to be attenuated since poorer attendance by the minority of individual patients who abuse substances would not substantially affect overall continuity of care at a particular site. The disappearance of significant associations between continuity of care and improvements in alcohol problems with the use of site averages may thus be attributable to the elimination of this potential selection bias. Analyses of average site values of continuity of care measures in fact resulted in associations of continuity of care with poorer outcomes, perhaps because sites with high continuity of care levels are more likely to retain patients who are doing poorly.

Thus, the most straightforward interpretation of these admittedly ambiguous findings is that results with individual level continuity of care measures largely reflect selection biases of the type that are often encountered in the analysis of observational outcome data. These biases were highlighted here by comparison of these results with results that used site averages. They suggest that a useful methodological check on observational outcome studies would be to conduct analyses that average individual level continuity of care measures at the site level to check on potential selection biases.

Three other limitations of this study require comment. First, although a methodological strength of this study is that the sample is a diagnostically homogeneous VA inpatient sample, this may limit the generalizability of the findings with regard to other populations, diagnostic groups, health care systems, and to treatment that is initiated in the outpatient setting. Additionally, as shown above, the sample is not perfectly representative of veterans receiving treatment in programs that provide specialized inpatient treatment for military-related PTSD, although the magnitude of the differences is small. A possible technique for increasing the response rate in the future would be to have a professional survey firm rather than VA staff implement the postdischarge survey.

Second, as with most administrative data sets, service utilization measures do not reflect care received outside the VA health care system. However, data from other studies^{31,32} suggest that it is likely that a relatively low percentage of the clients in the analytical sample actually received outpatient care from a non-VA source.

Third, baseline clinical measures were obtained upon entry into an inpatient treatment program. Although the models contained covariates to control for inpatient treatment effects, they may not have fully done so and the observed outcomes may thus reflect not only the effects of outpatient continuity of care but also some inpatient treatment effects.

The results of this study differ from 2 previous studies that examined the relationship between client outcomes and continuity of care. One study that used data from the same program as this one⁵ found 2 regularity of care measures to be significantly associated with declines in alcohol use. The analyses in the present study extend and qualify this previous work because analyses at the site level are included.

A second study, by Brekke and colleagues,¹² found significant associations between a regularity of care measure and changes in 3 client outcomes at a single study site. However, that study involved

severally mentally ill psychiatric patients and measures that focused on disruption of treatment over a much longer follow-up period (1 year). It also had a much smaller sample size ($n = 30$), and made no attempt to control for program or client characteristics, further precluding comparison with the findings presented here.

Implications for Behavioral Health Services

As discussed above, there is widespread interest in assessing the quality of mental health care using administrative data, and continuity of care measures are often used for this purpose. However, this study found that the relationship between continuity of care and client outcomes is complex and that relationships observed with individual level data may not be confirmed with the use of individual level measures aggregated to the site level. These findings do not necessarily imply that continuity of care measures should be abandoned as indicators of program quality. Rather, they highlight the need for more caution in the use of continuity of care measures as a proxy for client outcomes. They also suggest that the basis for continuity of care's assumed intrinsic value may need to be more clearly specified.

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